

Claims

1. A method for administering carbon monoxide to a patient, comprising the steps of
 - a) administering exogenous carbon monoxide to the patient,
 - b) determining the concentration of carbon monoxide in the patient's blood,
 - c) comparing the actual concentration of carbon monoxide in the blood with a preset, desired value; and
 - d) subsequently adjusting the amount of carbon monoxide delivered to the patient to obtain a concentration in the patient's blood corresponding to the preset desired value; and optionally repeating steps b) – d).
2. The method according to claim 1 wherein the concentration of carbon monoxide in the blood is determined by a method selected from the group consisting of: measuring the concentration of carboxyhemoglobin (HbCO) in the blood, measuring the concentration of oxyhemoglobin (HbO₂) in the blood, measuring the activity of enzymes in the blood; and measuring the CO content of the air expired by the patient.
3. The method according to claim 2 wherein the carboxyhemoglobin (HbCO) is determined by non-invasive measurement, or is determined from a blood sample.
4. The method according to claim 2 wherein the measurement of the oxyhemoglobin (HbO₂) in the blood is carried out by oxymetry.
5. The method according to claim 2 wherein the measurement of the composition of the expired air is carried out by spectroscopic or electrochemical methods.
6. The method according to any one of the preceding claims wherein the carbon monoxide is delivered to a patient as a pure gas, in a gas mixture, dissolved in a fluid, or by administering a carbon monoxide donor.

7. The method according to any one of the preceding claims wherein the carbon monoxide is delivered to the patient through inhalation, insufflation, intravenously, or rectally.
- 5 8. The method according to claim 6 wherein the carbon monoxide containing gas mixture is administered by way of admixing it into the breathing air of a patient.
9. The method according to claim 7 or 8 wherein the carbon monoxide is delivered for inhalation in pulses, wherein the pulses may be inspiration and/or expiration
10 triggered.
10. The method according to claim 8 or 9 wherein the concentration of carbon monoxide in the blood is controlled by the oxygen content of the breathing gas.
- 15 11. The method according to claim 8 wherein the administration of carbon monoxide is performed via sequences of pulses, wherein the number and length of the pulses in each sequence and/or the number of sequences is regulated depending on the determination of the concentration of carbon monoxide in the blood.
- 20 12. The method according to any one of the preceding claims wherein the patient is spontaneously breathing or artificially breathing.
13. The method according to any one of the preceding claims wherein the concentration of carbon monoxide in the blood is determined by at least two separate methods of
25 measurement.
14. An apparatus for administering carbon monoxide to a patient, the apparatus comprising a delivering unit, a carbon monoxide source, a dosing unit for administering carbon monoxide to the patient, sensor means for determining the
30 concentration of carbon monoxide in the blood, and control means for regulating the dosing unit depending on feedback from the sensor unit.
15. The apparatus according to claim 14, wherein the carbon monoxide source is a source providing carbon monoxide gas, optionally in a mixture with one or more

other gases, and wherein the dosing unit is for administering the carbon monoxide gas or the carbon monoxide containing gas mixture into the breathing gas mixture of a patient.

- 5 16. The apparatus according to any one of claims 14 or 15 wherein the delivering unit is selected from the group consisting of a respirator, a ventilator, a face mask, and a nose cannula.
- 10 17. The apparatus according to any one of claims 14 to 16 characterised in that the apparatus comprises at least two independently working sensor means for the determination of carbon monoxide in the blood.
- 15 18. The apparatus according to any one of claims 14 to 17 wherein at least one of the sensor means is connected to an alarm unit.
- 20 19. The apparatus according to any one of claims 14 to 18 wherein the sensor means are selected from the group consisting of: means for measuring the concentration of carboxyhemoglobin (HbCO), means for measuring the concentration of oxyhemoglobin (HbO₂) in the blood, means for measuring the activity of enzymes in the blood; and means for measuring the composition of the air expired by the patient.
- 25 20. The apparatus according to any one of claims 14 to 19 further comprising a filter unit through which the air expired by the patient is passed in order to remove excess carbon monoxide from the expired gas, wherein the filter is a physical or a chemical filter.
- 30 21. Use of a delivering unit, a carbon monoxide source, a dosing unit for administering carbon monoxide to a patient, a sensor means for determining the concentration of carbon monoxide in the blood, a control means for regulating a carbon monoxide dosing unit, or a filter unit suitable to remove excess carbon monoxide from expired gas, said filter being a physical or chemical filter, in a method according to any one of claims 1-13.